

# ABSTRACT OF THE DISCLOSURE

5 A self-contained system uses light reflectivity to examine intensity of a dyed spot on a device membrane surrounded by background area to discern information about the specimen that produced the spot. In a preferred embodiment, a master clock alternatively drives one LED  
10 focussed upon the spot center, and then drives two LEDs focused on the background area. Light reflected from the spot and background is detected by preferably two photodetectors ("PDs") spaced-apart a multiple of 90° azimuthal, a configuration discovered to minimize the  
15 effects of uneven membrane topography upon light intensity measurements. The PD outputs are average-summed together and are input to a phase lock-in amplifier system that enhances detected signal/noise by measuring signal voltage without producing noise. The lock-in system  
20 simultaneously positively and negatively amplifies the average-summed PD outputs, which amplified signal is then switched in synchronism with the LED drive signals. Only in-phase signals occurring during the active LED drive signal portion are sampled, and signal components present  
25 in the average-summed together PD output are essentially doubled in effective amplitude, thereby enhancing signal to noise ratios. The output of the switch is lowpass filtered to recover a noise-free DC level proportional to detected light intensity. A readout of the DC level  
30 provides an accurate measurement of the spot intensity.